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Shielding device for connection strips in telecommunications and data engineering

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The invention relates to a shielding device for connection strips in telecommunications and data engineering, comprising a number of shielding plates and at least one base rail allocated to the latter.

A shielding device of the generic type is already known from the connection strip disclosed in US 5,160,273. Here, the problem of crosstalk between adjacent insulation-piercing terminal contact elements of the connection strip is solved by the insertion of a multiplicity of electrically conductive shielding plates between the individual pairs of insulation-piercing terminal contact elements. The problem of crosstalk occurs when transmitting large volumes of information via electrical lines, the information being transmitted at high frequencies. Transmitting at high frequencies produces radiation and interference between adjacent lines, particularly when these lines are arranged close beside one another in the connection strip. Electrically conductive shielding plates are inserted between a pair of insulation-piercing terminal contact elements, the spacing between two adjacent pairs of insulation-piercing terminal contact elements being larger than the spacing between adjacent insulation-piercing terminal contact elements in a pair. The shielding plates are in this case inserted

between pairs of insulation-piercing terminal contact elements in slots which extend transversely to the longitudinal direction of the plastic body of the connection strip, and contact the base rail situated in the longitudinal direction inside the plastic body. A disadvantage of this is that, when fitting the component into the plastic body, it is first necessary to fit the base rail, which has contact tongues for contacting the individual shielding plates, and that it is subsequently necessary to push the individual shielding plates into the connection strip. Consequently, the complexity of assembly is relatively high in order to provide the connection strip with the shielding device for high transmission rates in telecommunications and data engineering.

The invention is therefore based on the object of improving the shielding device of the generic type in order to simplify assembly.

To achieve this object, the invention provides for the shielding plates and the base rail to be integrally formed from a metal plate, and for each shielding plate to be connected to the base rail via a narrow web and arranged rotated through approximately 90° with respect to the base rail. The shielding device according to the invention thus forms an integral component which is made of metallic material and which, during assembly of a connection strip for telecommunications and data engineering, is inserted into the plastic housing of the connection strip with its base rail, and its shielding plates, which are integrally connected to the base rail, are guided into all the preformed slots inside the connection strip at the same time. This simplifies assembly considerably.

In a further embodiment of the invention, the spacings between the shielding plates on a base rail may be designed to be different from one another. This enables a shielding plate to be matched to different applications.

The invention also relates to a method of producing the shielding device in accordance with patent claim 3, to a connection strip for the shielding device in accordance with patent claim 5, and finally to the use of the shielding device inside a connection strip in accordance with claim 6.

The invention is explained in more detail below with the aid of an exemplary embodiment of a shielding device which can be fitted, or is fitted, into a connection strip for telecommunications and data engineering. This exemplary embodiment is illustrated in more detail in the drawings, in which:

Figure 1 shows a perspective illustration of the shielding device,

Figure 2 shows a front view,

Figure 3 shows a plan view,

Figure 4 shows a plan view of a metal sheet having punched-out shielding plates and the base rail,

Figure 5 shows an illustration, corresponding to Figure 4, of a part of the shielding device having a folded base rail,

Figure 6 shows a side view of a connection strip,

Figure 7 shows a cross section along the line A-A in Figure 6,

Figure 8 shows a plan view of the connection strip shown in Figure 6, and

Figure 9 shows a cross section along the line B-B in Figure 8.

In the exemplary embodiment, the shielding device 1 comprises seven flat, essentially U-shaped shielding plates 2, a base rail 3 and seven connection webs 4, which connect the individual shielding plates 2 to the base rail 3. The shielding device 1 is made of conductive metallic material and is integrally formed, in particular punched, with the shielding plates 2, the base rail 3, and the connection webs 4, from a metal sheet 28, particularly copper, copper alloys, steel or aluminum, the shielding plates 2 and the base rail 3

with the connection webs 4 initially lying in the same plane as the metal sheet 28. In a work step which follows the cutting-out process, the individual shielding plates 2 are rotated in the region of their connection webs 4 through 90° with respect to the base rail 3. A hole 5 in the base rail 3 is associated with each shielding plate 2 close to the connection web 4, and this hole 5 is used for adjustment during the production process. The metal sheet 28 may also be a metalized plastic strip or the like.

In the view of how the shielding device 1 is processed, shown in Figure 4, the individual shielding plates 2 are of U-shaped design, a roughly rectangular shielding panel 6 adjoining the connection web 4 and being provided with two prong-like shielding forks 7 at the end remote from the connection web 4. These shielding forks 7 are stepped by means of a shoulder 8 which tapers the cross section so that they are matched to the internal cross section of the connection strip 11.

Figure 4 shows the metal sheet 28 with cut-out or punched-out shielding plates 2 of width B with a mean spacing X between one another and with the cut-out or punched-out base rail 3 with the holes 5 which are used for adjustment during production. The length of the metal sheet 28 corresponds to the number of shielding plates 2 of width B plus the cut gaps.

Figure 5 shows the shielding plates 2 which are rotated through 90° with respect to the base rail 3 and are normally at a distance X from one another. To achieve a shorter distance X', a fold 9 is introduced into the base rail 3, as shown in Figure 8.

The shielding device 1 is used for shielding the individual insulation-piercing terminal contact elements 10 inside a connection strip 11 for high transmission rates in telecommunications and data engineering. Such a connection strip 11 having a plurality of insulation-piercing terminal contact elements 10 arranged in pairs is illustrated and

described in more detail in DE 43 25 952 C2. The connection strip 11 is illustrated in Figures 6 to 9 and is described in more detail below with respect to the shielding device 1 used.

The connection strip 11 comprises a plastic housing 12 made of an upper part 13 and a lower part 14 which are latched to one another by means of latching openings 15 in the upper part 13 and latching lugs 16 in the lower part 14. Terminal slots 17 are formed in the upper part 13 and have integrally formed terminal lugs 18 and terminal webs 19 which serve to hold the insulation-piercing terminal contact elements 10. The latter are formed from sheet-like flat material and comprise two contact webs 21 enclosing a contact slot 20 between them. A base web 22 is adjoined by contact fingers 23 which merge into spring contacts 24. Two pairs of insulation-piercing terminal contact elements 10 are respectively arranged close beside one another, the spacing D between two adjacent pairs of insulation-piercing terminal contact elements 10 being considerably larger than the spacing d between insulation-piercing terminal contact elements 10 which are close beside one another, as can be seen in Figure 6. The individual shielding plates 2 of the shielding device 1 are inserted into the total of seven wider cross-sectional regions 25 of the connection strip 11, as shown by dashed lines in Figures 6 and 7 and by solid lines in Figures 8 and 9.

To insert the base rail 3 with the individual shielding plates 2 into the housing 12 of the connection strip 11, the upper part 13 in the exemplary embodiment contains seven chambers 26 with respective transverse slots 27 into which the individual shielding plates 2 are pushed. The base rail 3 is situated in a longitudinal slot 21 in the bottom region of the lower part 14, as shown in Figures 7 and 9. The shielding panels 6 and shielding forks 7, which adjoin the latter, of the individual shielding plates 2 essentially take up the whole of the cross section of

the interior of the connection strip 11, as shown in Figure 9 in particular, and thus separate the individual pairs of insulation-piercing terminal contact elements 10 in such a manner that greater crosstalk attenuation is achieved for high transmission rates as a result of the electrically conductive shielding plates 2. The use of the large-area electrically conductive shielding plates 2 in the connection strip 11 does not require the physical volume of the connection strip to be enlarged, nor any greater expense to produce it.

The shielding device 1 does not require any grounding. It is important only that the individual shielding plates 2 are conductively connected to one another. This is achieved by means of the base rail 3, which is common to all the shielding plates 2. The shielding plates 2 influence the electrical field in such a way that the influence charging of an insulation-piercing terminal contact element 10 is reduced in the adjacent insulation-piercing terminal contact element 10, and the interference voltage is thus small. This produces a relatively high signal-to-noise ratio. The signal-to-noise ratio becomes higher, with the result that higher frequencies can be transmitted without the adjacent lines of the insulation-piercing terminal contact elements 10 having an adverse effect on one another.

The number of shielding plates 2 in a shielding device 1 depends on the number of pairs of insulation-piercing terminal contact elements 10. In the exemplary embodiment, an 8-pair module is illustrated, which has seven chambers 26 for a total of seven shielding plates 2. Common pairings are 4/3, 8/7, 10/9, 12/11, 16/15, 20/19, 24/23 and 25/24, where the number of pairs of insulation-piercing terminal contact elements 10 and the number of shielding plates 2 are indicated in each case.

For a HIGHBAND 8 connection strip 11, the standard spacing X between the shielding plates 2 is

X = 12.6 mm. However, for a HIGHBAND 10 connection strip 11, for example, the spacing is X' = 9.6 mm. For this, the folds 9 are introduced into the base rail 3 between each of the individual shielding plates 2. This spacing cannot be achieved by directly punching the shielding device 1 out of a metal sheet 28, since the width B of the individual shielding plate 2 needs to be around 12 mm on account of the width of the connection strip 11. Hence, for a HIGHBAND 8 connection strip 11, the dimensions width B = 12.6 mm and spacing X = 12.6 mm complement one another well. For a narrower spacing X', however, folds 9 are necessary; these may be replaced by any other kind of means for shortening the length of the base rail 3.

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Nov. 18, 1998
(98-025 DE)

LIST OF REFERENCE NUMERALS

1	Shielding device
2	Shielding plate
3	Base rail
4	Web
5	Hole
6	Shielding panel
7	Shielding fork
8	Shoulder
9	Fold
10	Insulation-piercing terminal contact elements
11	Connection strip
12	Plastic housing
13	Upper part
14	Lower part
15	Latching opening
16	Latching lug
17	Terminal slot
18	Terminal lug
19	Terminal web
20	Contact leg
21	Longitudinal slot
22	Base web
23	Contact finger
24	Spring contact
25	Cross-sectional region
26	Chamber
27	Transverse slot
28	Metal sheet